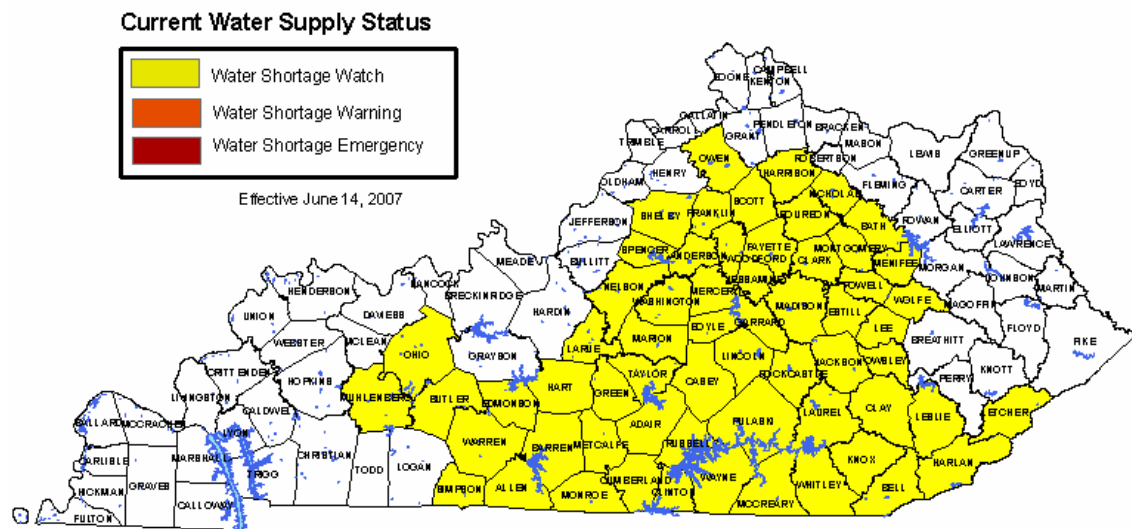


Drought

The Kentucky Division of Water continuously monitors hydrologic conditions throughout the state, including precipitation, streamflows, lake elevations and various drought indices. This information is used to detect emerging drought conditions, to identify the locations and severity of drought and to provide timely and appropriate public notification.

Kentucky Drought Monitoring Center



[Water Shortage Notification System Explained](#)

Statewide Summary of Drought Development

Current for the week of June 25, 2007

***UPDATE* June 15 - State Declares Water Watch Shortage for 61 Counties (To view press release please [click here.](#))**

Kentucky is currently experiencing moderate to severe drought conditions as a result of a substantial deficit in precipitation that has been accumulating since November 2006. **At the present time, there have been no reported shortages at water supply intakes.** With continued dry days and warm temperatures, the potential for high demands to stress the treatment, storage, or distribution of potable water is increased. Citizens in the Water Shortage Watch area should be prepared to reduce non-essential uses of water if asked to do so by their water providers.

Drought can increase the potential for unsustainable demands from water customers to overwhelm a water supplier's ability to treat, pump or store adequate quantities of potable water. Now is the time to consider limiting outdoor water uses to those that are essential for the survival of landscaping, trees or new plantings. Refrain from car washing, hosing down of sidewalks and patios and large-scale watering of lawns that are browning and entering dormancy from the unusually dry conditions. **Above all, be aware of any statements or requests that come from your local water supplier and make every attempt to contribute to the fulfillment of those requests.**

Useful Drought Indicators

PRECIPITATION

The Division of Water monitors a network of 24 daily climate-reporting stations to track developing shortages of precipitation. Precipitation deficits for the water year range from 60 percent of normal in the Eastern climatic division to 75 percent of normal in the Central climatic division. Shorter term deficits have been reduced with the precipitation of the past week but still remain at or below 40 percent of normal for the past 30 days. Statewide, the combined rainfall for the months of February through May of this year ranked as the second driest for the period since at least 1895 -- the first year of the instrumental record.

STREAMFLOWS

Streamflows across Kentucky have held and even improved slightly in many areas after a week of scattered and sometimes heavy storms. Streams in the Green, Barren, lower Kentucky, lower Licking and most of the Salt River basins continue to flow at low or below normal rates. Areas including the Tradewater River basin and those further west are holding up well and are within a normal range of flow for this time of year in most streams. Similarly, most streams in the Eastern climatic division are within a normal to low-normal range of flow in spite of precipitation deficits of up to 10 inches below normal. At this time, there are no indications of any immediate problems with water supplies for those systems relying on rivers and streams.

LAKE ELEVATIONS

Most small water-supply lakes are not heavily impacted at this time. Lakes under the control of the [Huntington District](#), [Louisville District](#) and [Nashville District](#) of the U.S. Army Corps of Engineers continue to operate along their normal lake elevation curves. Two exceptions are the Barren River Reservoir in Barren County and Rough River reservoir in Breckinridge County. Barren River reservoir is having difficulty bringing the elevation to normal pool and is currently down by 7.1 feet. Discharges from the dam have been at or near the minimum release since March 20, 2007. Similarly, Rough River reservoir is 1.8 feet below normal pool and has been at or near to minimum release since March 16, 2007. Releases from Corps of Engineer reservoirs are important to the status of many Kentucky rivers as sources of supply for drinking water, assimilation of wastewater discharges, water quality and aquatic habitat. These rivers include the Green, Barren, Rough, Nolin, Kentucky, Salt, Licking and Big Sandy rivers.

DROUGHT INDICES

Assessing the severity of a drought is made easier with the use of drought indices that combine various source information into a single representative value of drought severity. The [Palmer Drought Severity Index](#) uses data for precipitation, temperature and evapotranspiration (the water returned to the atmosphere through the combined actions of evaporation and plant growth) to calculate a number that can be compared across different times and locations. This index was developed in the 1960's in Kansas and Nebraska but has since become a part of drought monitoring in a majority of the United States. The Palmer Drought Severity Index is updated weekly on Monday afternoons.

A second and more recent drought index is the Climate Prediction Center's Drought Monitor. The [Drought Monitor](#) represents a comprehensive assessment of several factors that contribute to the development of drought or that indicate the severity and potential persistence of drought. The Drought Monitor is updated weekly on Thursday mornings.

The Palmer Drought Severity Index and the Drought Monitor should be considered in combination with more localized data such as rainfall, streamflows, groundwater levels and climatic outlooks to form an accurate assessment of drought severity in a given location.

For the week of June 25 the Palmer Drought Severity Index places the Western, Bluegrass and Eastern climatic divisions in the severe drought category. The Central climatic division remains in the moderate drought category. When the additional factors included by the Drought Monitor are considered, severe drought is dominant across most of Kentucky with a small area of extreme drought delineated along the Kentucky-Tennessee border in counties of the Upper Cumberland river basin.

Drought Monitoring

Drought is a natural and recurring feature of our climate that can be considered a "severe" weather event much like a tornado, a flood or a hurricane. However, there are a few key differences that distinguish drought from other weather events that make it difficult to detect, track and respond to drought.

Part of the difficulty in detecting drought is in the lack of an obvious onset of drought conditions. A drought develops slowly and can appear to mimic a normal spell of dry weather in the summer, a time of the year when dry weather is accepted and expected. Short-term rainfall shortages create problems for agricultural crops, livestock, urban landscapes and other activities that depend on stored soil moisture between rainfall events. We are accustomed to dealing with short-term dry spells in part because there is an expectation that rainfall is just around the corner. However, when rainfall shortages persist for weeks or months at a time, activities that depend on long-term storage of water will be adversely impacted as well. Droughts in Kentucky can have serious negative consequences for drinking water supplies, energy production, commercial and industrial operations, recreation and aquatic habitat.

The negative impacts of drought cannot be avoided but there are ways to reduce them to a manageable level. All water suppliers in the commonwealth should have a water shortage response plan to guide both the supplier and customer during a drought event. It is important for customers to listen to their water suppliers and be ready to take necessary actions to prevent a water shortage problem from developing. This is critical to a successful outcome because the only way to effectively manage the source of water supply is to first manage the demand for water.

There is no easy method for determining when a dry spell has become a drought, how long a drought will persist or how intense a drought may become. However, by closely tracking certain sources of information, referred to as drought indicators, it is possible to detect potential drought development early enough to allow at least some lead-time for notification and initiation of drought response preparations at the local level. The Division of Water monitors for the potential development of drought in Kentucky by tracking precipitation, streamflows, lake levels, groundwater and water supplies. There are also several tools that are useful in assessing the severity of a "dry spell" and the potential impacts to agriculture, forest fires, water supplies and other vulnerabilities to drought. These tools include the Palmer Drought Severity Index, the Drought Monitor, the Standardized Precipitation Index and several others.

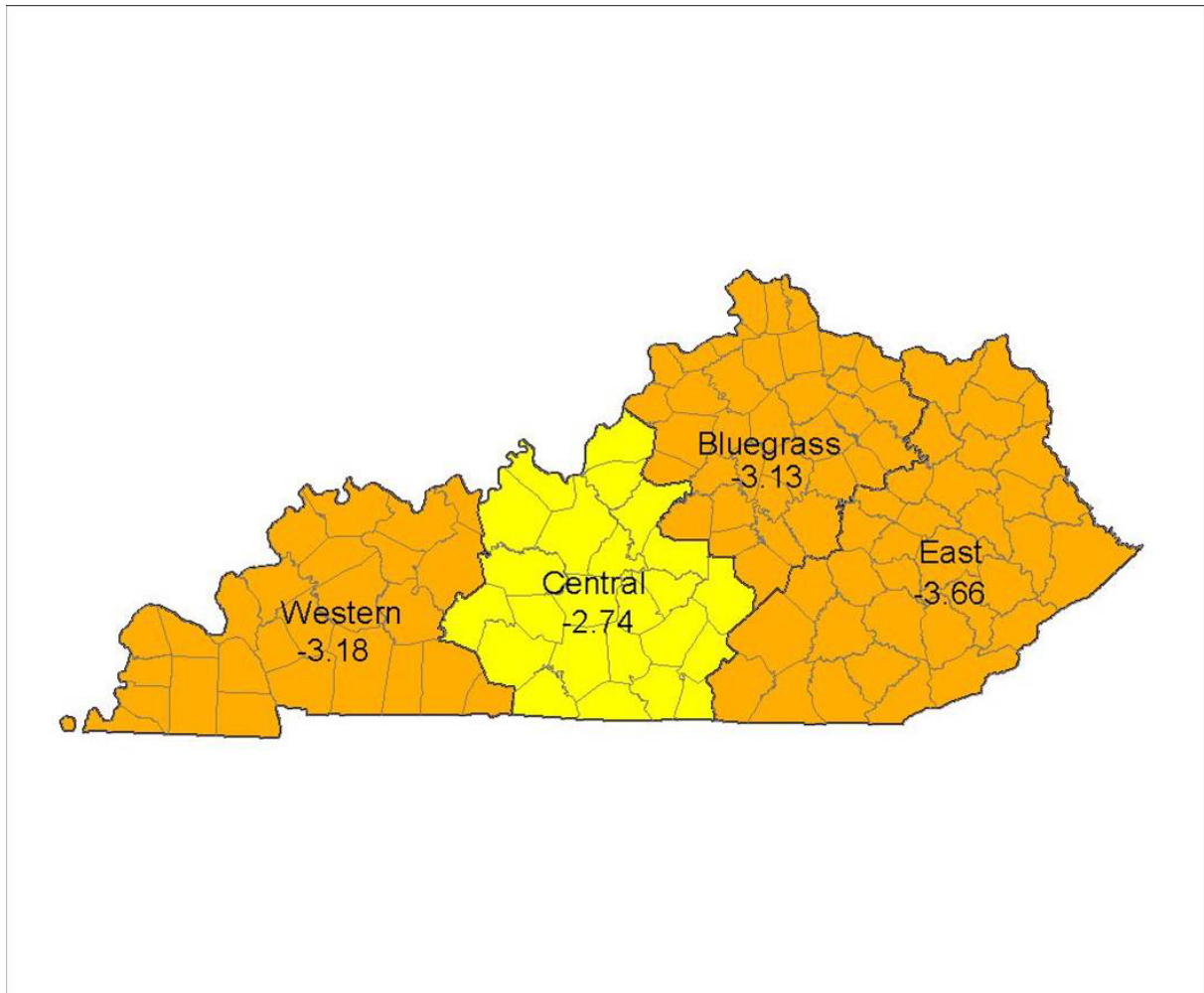
The Drought Monitoring pages will be updated on a weekly basis to provide timely information and assessments of current drought conditions in Kentucky. There will also be numerous links to other resources and drought information pages from various state and federal agencies.

Current for the week of June 25, 2007

Palmer Drought Severity Index The Palmer Drought Severity Index (PDSI) is compiled weekly by the Central Region Climate Prediction Center (National Centers for Environmental Prediction, National Weather Service and National Oceanic and Atmosphere Administration) and provided on the University of Kentucky Agricultural Weather Center's Web site. This index is useful for placing a developing drought into context with past droughts and serves as a measure of current conditions. The index

also provides a standardized assessment of developing drought conditions that can be compared between different areas of the state or even between different states.

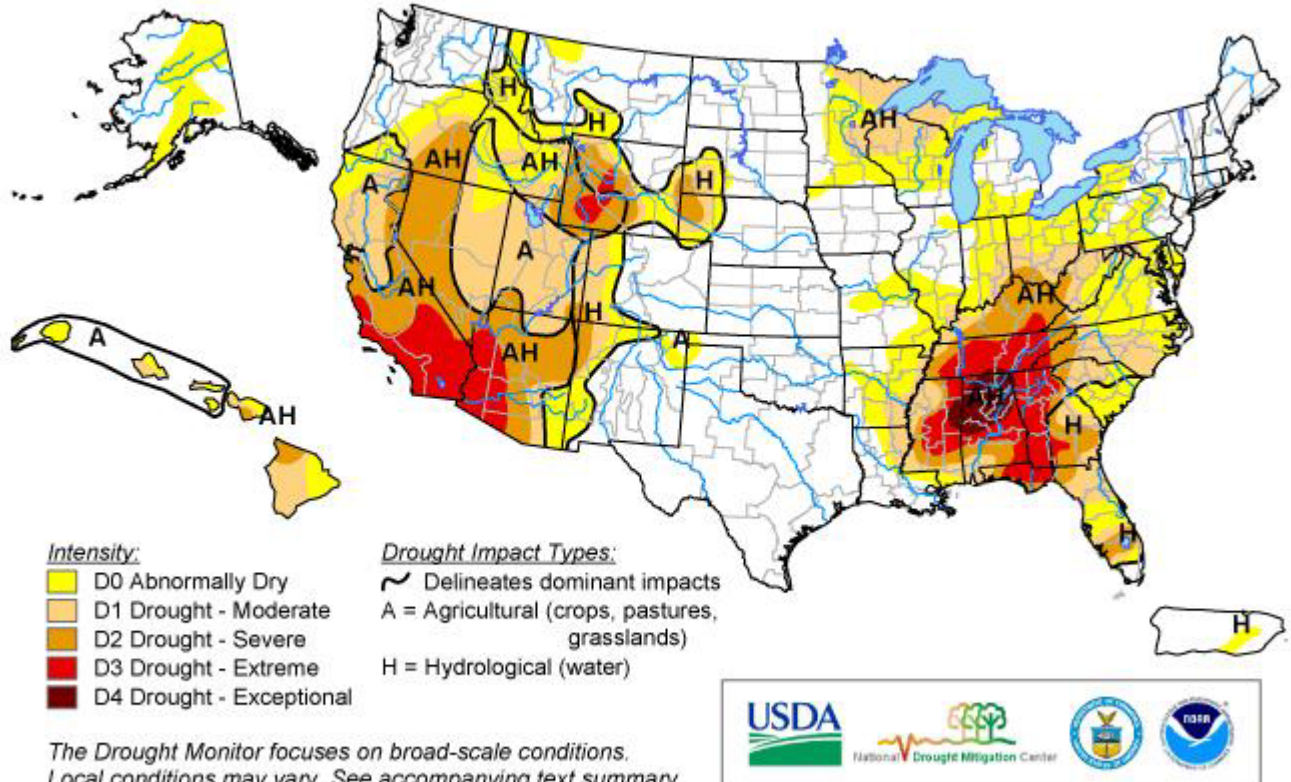
PDSI values can be categorized as follows:



- 0 to -0.99 = near normal
- -1.00 to -1.99 = mild drought
- -2.00 to -2.99 = moderate drought
- -3.00 to -3.99 = severe drought
- -4.00 and below = extreme drought

U.S. Drought Monitor

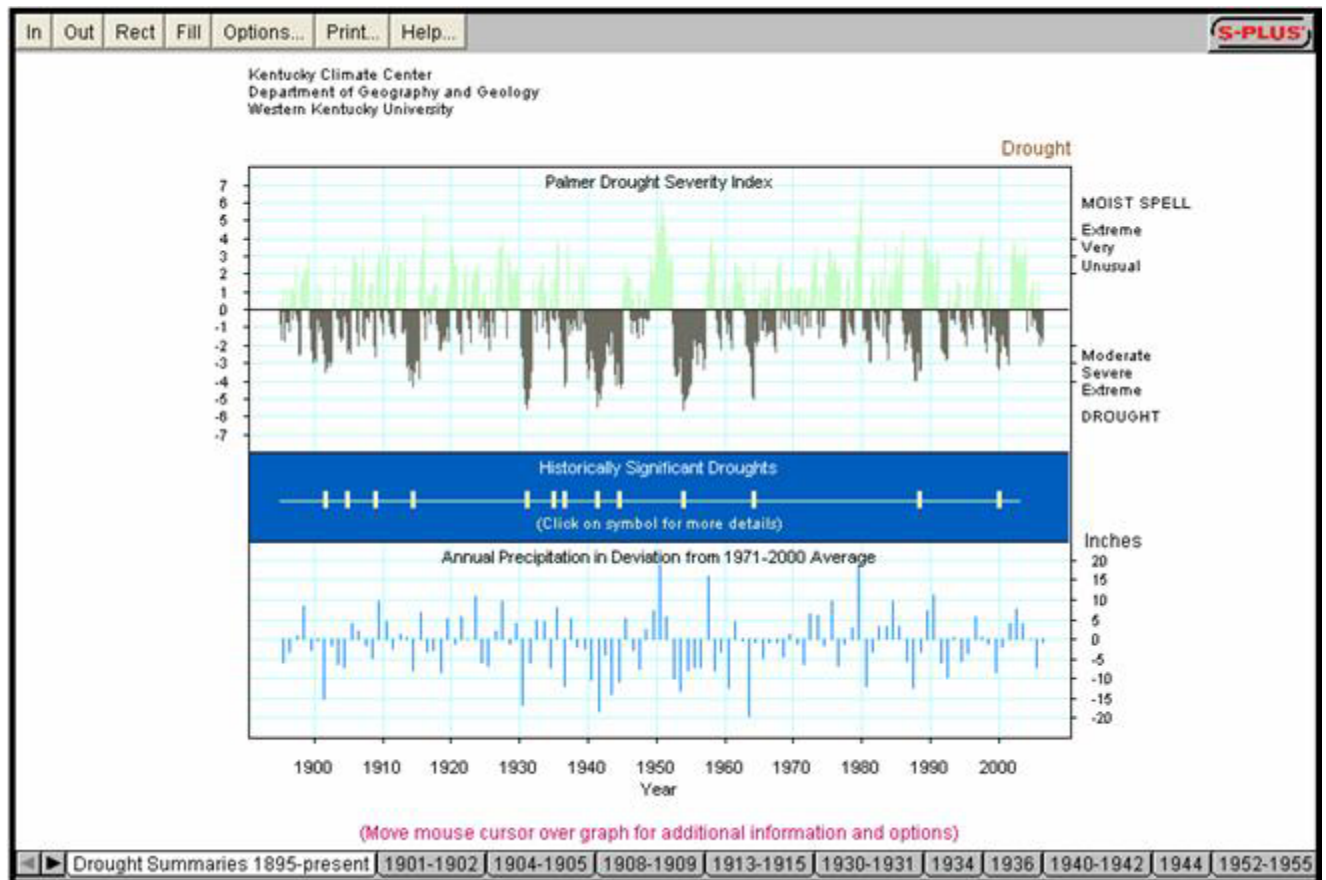
June 26, 2007
Valid 8 a.m. EDT



<http://drought.unl.edu/dm>

Released Thursday, June 28, 2007
Author: Douglas Le Comte, CPC/NOAA

Tracking drought blends science and art. No single definition of drought works for all circumstances, so people rely on drought indices to detect and measure droughts. But no single index works under all circumstances, either. The Drought Monitor is a synthesis of multiple indices, outlooks and news accounts, that represents a consensus of federal and academic scientists. A detailed description of the parameters used to create the Drought Monitor can be found [here](#).



Interactive graphs displaying drought indices since 1895 for Kentucky's four climate divisions. Users can identify and explore the development of historically significant droughts.

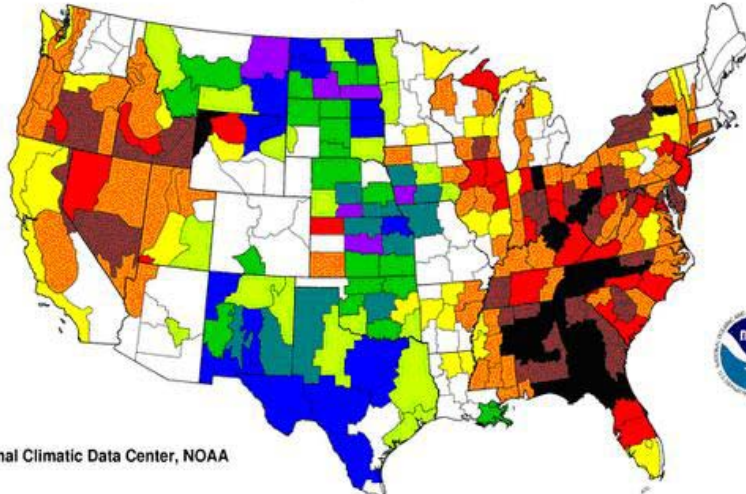
Examining the past can be a useful tool in interpreting the significance of a developing drought situation. Comparisons of the current drought to the historical record provide a frame of reference for evaluating how serious the current drought has become, and how it might develop in the coming months. One of the best tools to evaluate past droughts is found at the Kentucky Climate Center at Western Kentucky University. Click on the figure at the left to visit this site and learn more about the history of drought in Kentucky.

[The Standardized Precipitation Index](#)

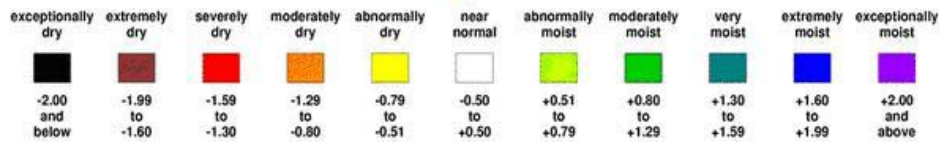
The Standardized Precipitation Index (SPI) is a way of measuring drought that is different from the PDI. Like the PDI, this index is negative for drought and positive for wet conditions. But the SPI is a probability index that considers only precipitation, while Palmer's indices are water balance indices that consider water supply (precipitation), demand (evapotranspiration) and loss (runoff).

Standardized Precipitation Index One Month

May 2007

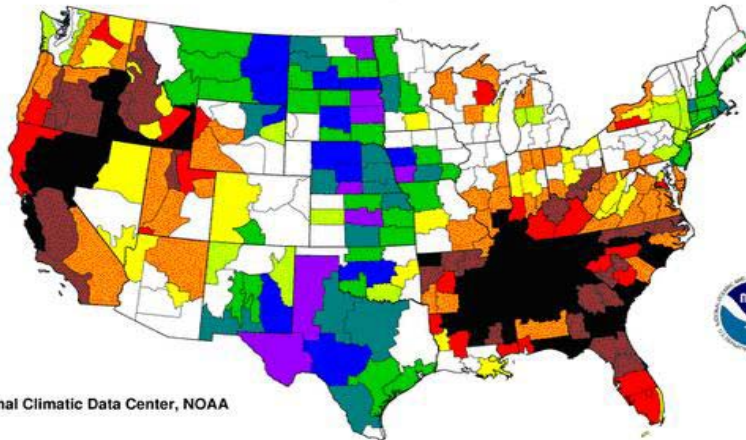


National Climatic Data Center, NOAA

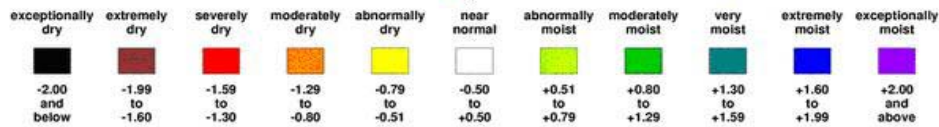


Standardized Precipitation Index Three Months

March-May 2007

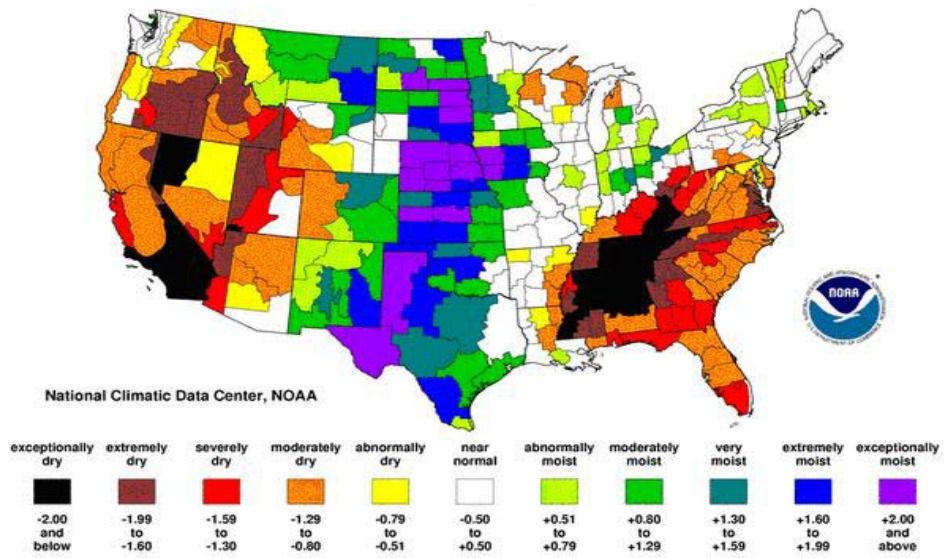


National Climatic Data Center, NOAA

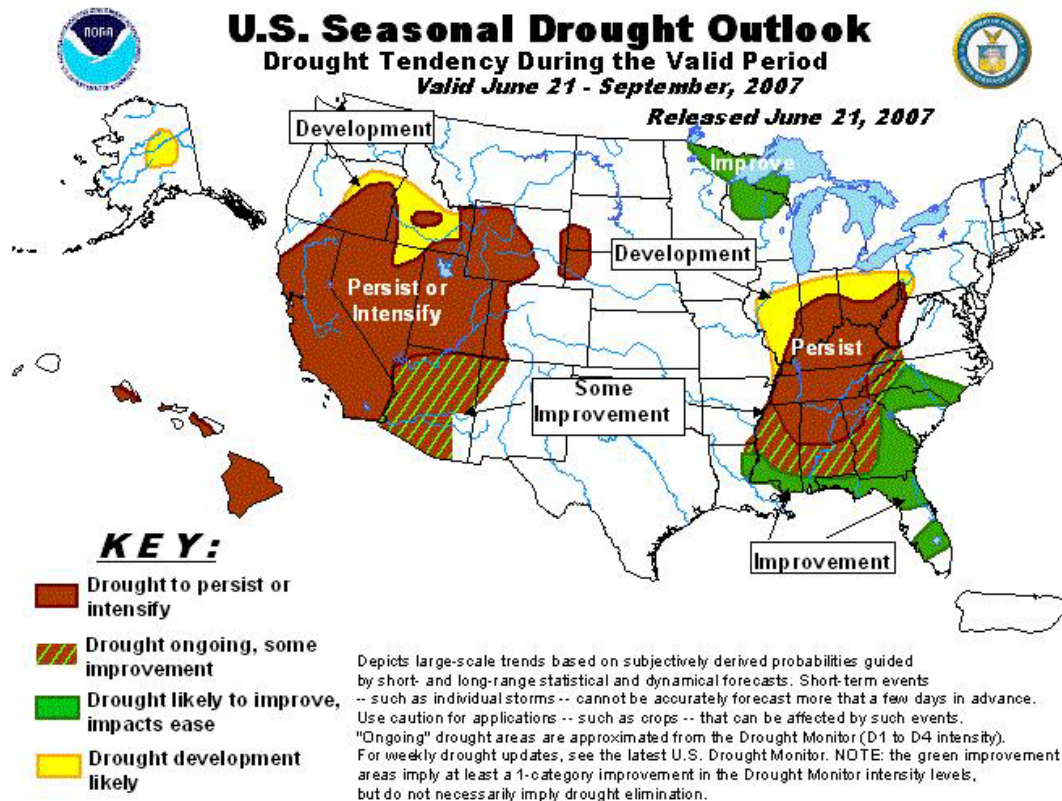


Standardized Precipitation Index Six Months

December 2006-May 2007



U.S. Seasonal Drought Outlook



The Climate Prediction Center issues the U.S. Seasonal Drought Outlook each month in conjunction with the release of the long-lead temperature and precipitation outlooks.

Weather and Climate

PRECIPITATION

Current for the week of June 25, 2007

(Click on images to enlarge)

Precipitation: Data for the previous 30/60/90-day period and the Water Year Beginning October 01, 2006

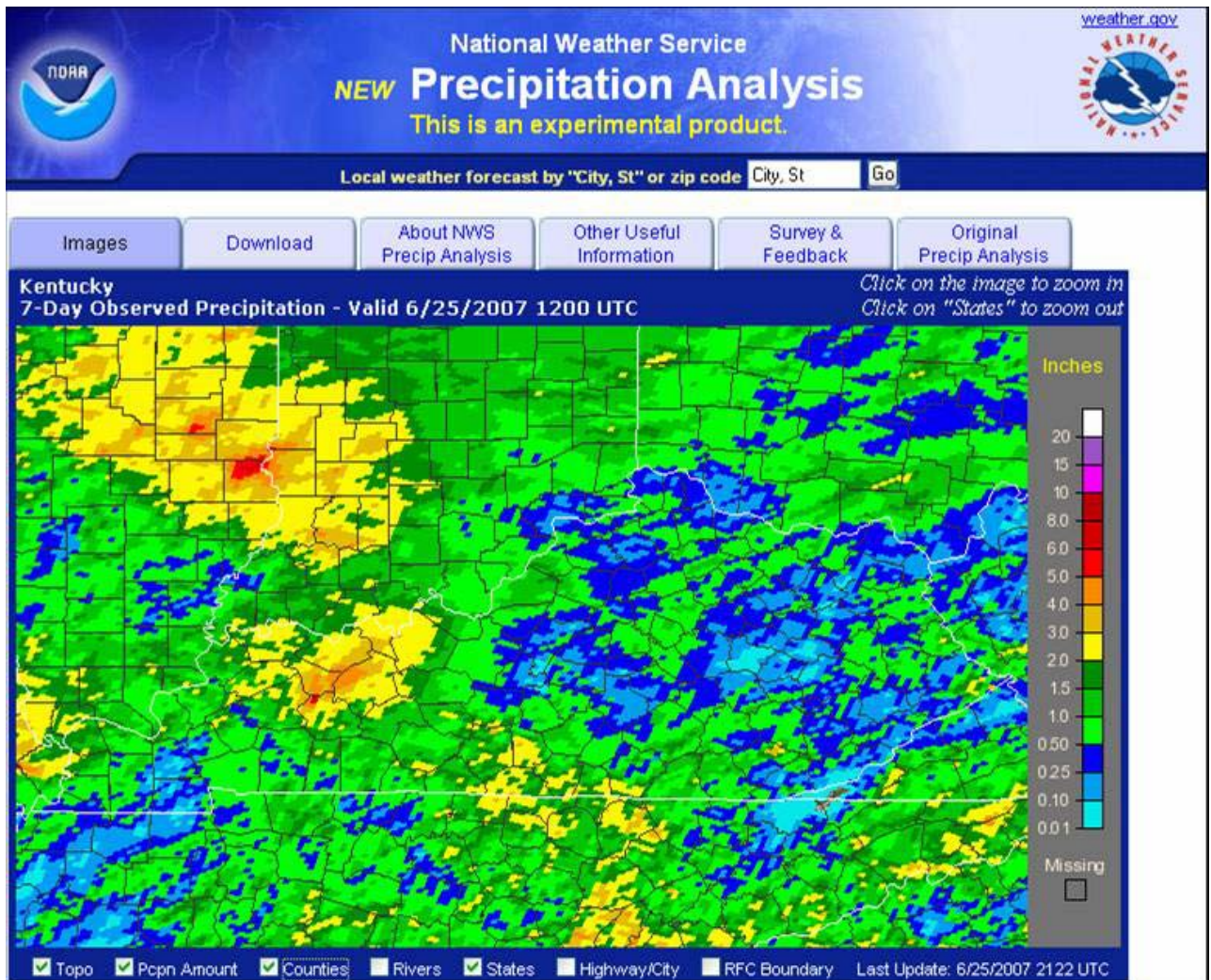
Station	Water Year		30/60/90 Day Total Precipitation and Departure From Normal					
	Precipitation Totals (inches)	Departure From Normal (inches)	30 Day Total (inches)	30 Day Departure (inches)	60 Day Total (inches)	60 Day Departure (inches)	90 Day Total (inches)	90 Day Departure (inches)
Henderson	32.27	1.35	1.29	-3.28	5.88	-2.85	9.26	-4.06
Paducah	33.68	-1.04	2.32	-2.63	5.75	-4.04	8.72	-5.87
Princeton	30.11	-6.18	2.05	-2.88	5.96	-3.64	8.32	-6.07
Mayfield	27.58	-10.52	0.60	-4.16	3.85	-5.93	5.75	-9.21
Louisville	30.34	0.04	1.19	-3.26	6.33	-2.39	9.31	-3.87
Bardstown	27.05	-2.41	0.61	-3.84	5.24	-3.16	8.62	-3.98
Hardinsburg	29.47	-4.05	1.24	-3.48	5.51	-3.58	7.82	-5.70
Campbellsville	29.07	-6.24	1.69	-3.51	7.53	-2.45	11.86	-2.88
Nolin Lake	30.33	-5.12	3.35	-1.90	8.12	-1.79	10.49	-3.60
Glasgow	27.72	-8.33	1.38	-3.63	6.30	-3.32	9.49	-4.98
Bowling Green	25.25	-10.23	2.58	-2.26	6.60	-2.63	7.55	-6.52
Covington	24.60	-3.06	0.92	-3.31	3.46	-4.58	6.07	-6.02
Williamstown	32.10	2.93	1.80	-2.53	5.99	-2.51	12.43	-0.56
Spindletop	21.72	-7.66	1.30	-3.07	4.69	-3.63	7.17	-5.35
Lexington	26.89	-2.48	2.22	-2.14	5.96	-2.35	8.75	-3.76
Dix Dam	24.47	-6.36	1.26	-3.38	5.62	-3.30	9.45	-3.70
Berea	24.11	-6.60	1.49	-3.28	5.69	-3.41	9.30	-3.93
Grayson	24.78	-2.65	1.82	-2.06	5.34	-2.71	8.35	-3.19
Jackson	21.76	-9.63	1.88	-2.52	4.27	-4.27	5.67	-7.06
Quicksand	20.38	-11.12	1.87	-2.65	4.21	-4.45	5.60	-7.24
Buckhorn Lake	18.13	-12.27	0.63	-3.51	3.84	-4.09	6.00	-6.04
London	21.97	-9.18	0.96	-3.29	5.88	-2.32	6.66	-5.77
Somerset	26.75	-7.78	1.30	-3.80	5.31	-4.23	7.63	-6.30
Cumberland Gap	20.80	-14.40	0.30	-4.44	4.62	-4.30	7.75	-5.93

Climatic Division	Normal Precip. Water Year	Normal Precip. Calendar Year	Percent of Normal Precipitation				
			Water Year	Calendar Year	30 Day	60 Day	90 Day
Western (1)	37.39	25.14	86	70	43	46	62
Central (2)	36.13	24.48	83	75	41	59	70
Bluegrass (3)	31.88	21.77	82	74	38	45	66
Eastern (4)	34.10	23.10	68	60	39	46	55

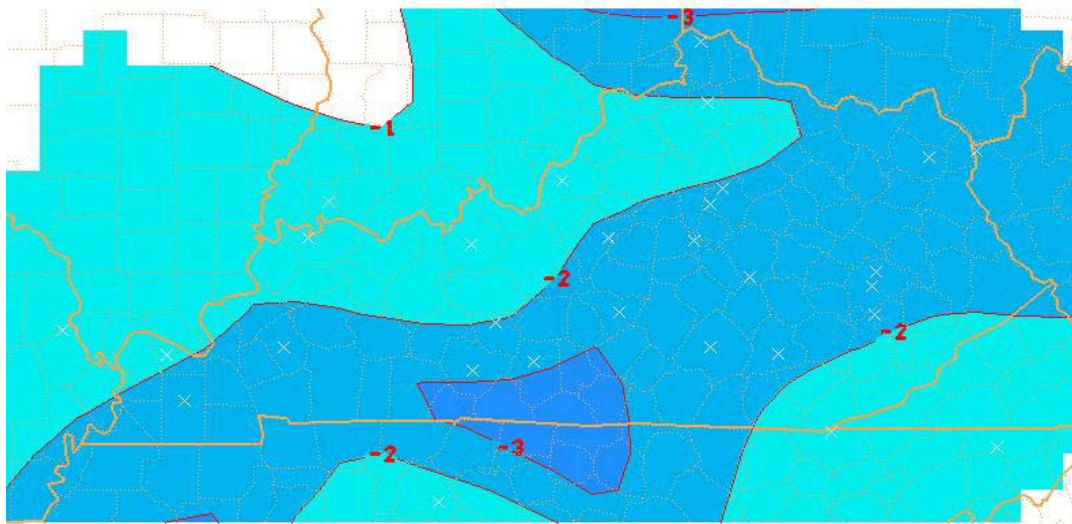
The Division of Water monitors a network of 24 daily climate-reporting stations to track developing shortages of precipitation. Precipitation deficits for the water year range from 60 percent of normal in the Eastern climatic division to 75 percent of normal in the Central climatic division. Shorter-term deficits have been reduced with the precipitation of the past week but still remain at or below 40 percent of normal for the past 30 days. Statewide, the combined rainfall for the months of February through May of this year ranked as the second driest for the period since at least 1895 -- the first year of the instrumental record.

A majority of precipitation for the past week was recorded in the Central and Western climatic divisions. Seven-day totals between 1.5 and 3 inches were recorded in an area including parts of Breckinridge, Butler, Caldwell, Crittenden, Daviess, Grayson, Henderson, Hopkins, McLean, Meade, Muhlenberg, Ohio and Union counties. Parts of Henderson, McLean and Ohio counties received as much as 5 inches. Precipitation was more spotty across the rest of the Central and Western climatic divisions but there were some relatively large areas that received between 1 and 3 inches. These include the Purchase (Ballard, Carlisle, Graves, Hickman, McCracken counties) and south-central Kentucky (Allen, Barren, Clinton, Cumberland, Metcalfe, Monroe counties).

Precipitation in the Bluegrass and Eastern climatic divisions was scattered with amounts generally ranging from .1 to .5 inches. However, amounts between 1 and 2 inches were recorded in some areas including Jefferson, Oldham and west Shelby counties; Fayette, Harrison and Jessamine counties; and Knox, McCreary, Martin and Pike counties. The spotty nature of the past week's precipitation is typical of summertime conditions, and we can expect more of the same for the next few days as showers and thunderstorms build with the heat of the afternoon and evening.



ATTENTION: One of the best tools to assess the amount and distribution of precipitation in Kentucky is the National Weather Service's [Precipitation Analysis Product](#). Data can be displayed for many different time frames and can be selected to show not only the amounts, but also the deficits and percentages of normal for each time frame.

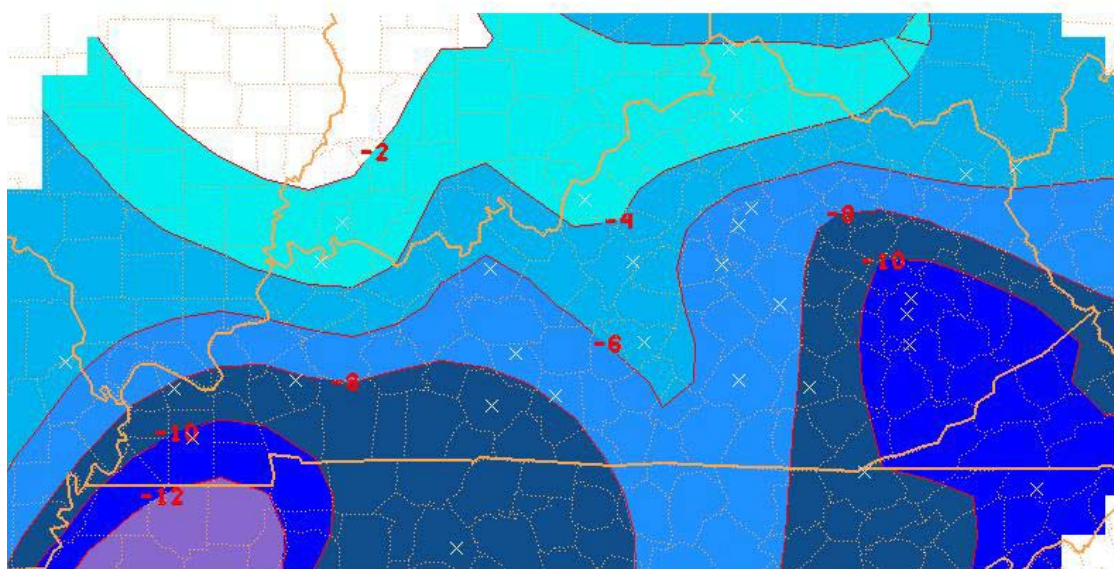


06/26/07 - 30 Day Precip Deviation from Normal (inches)
Ending 7 pm Yesterday

-6.0 -5.0 -4.0 -3.0 -2.0 -1.0 0.0 0.5 1.0 2.0 3.0 4.0 5.0 6.0 7.0



UK
University of Kentucky
College of Agriculture



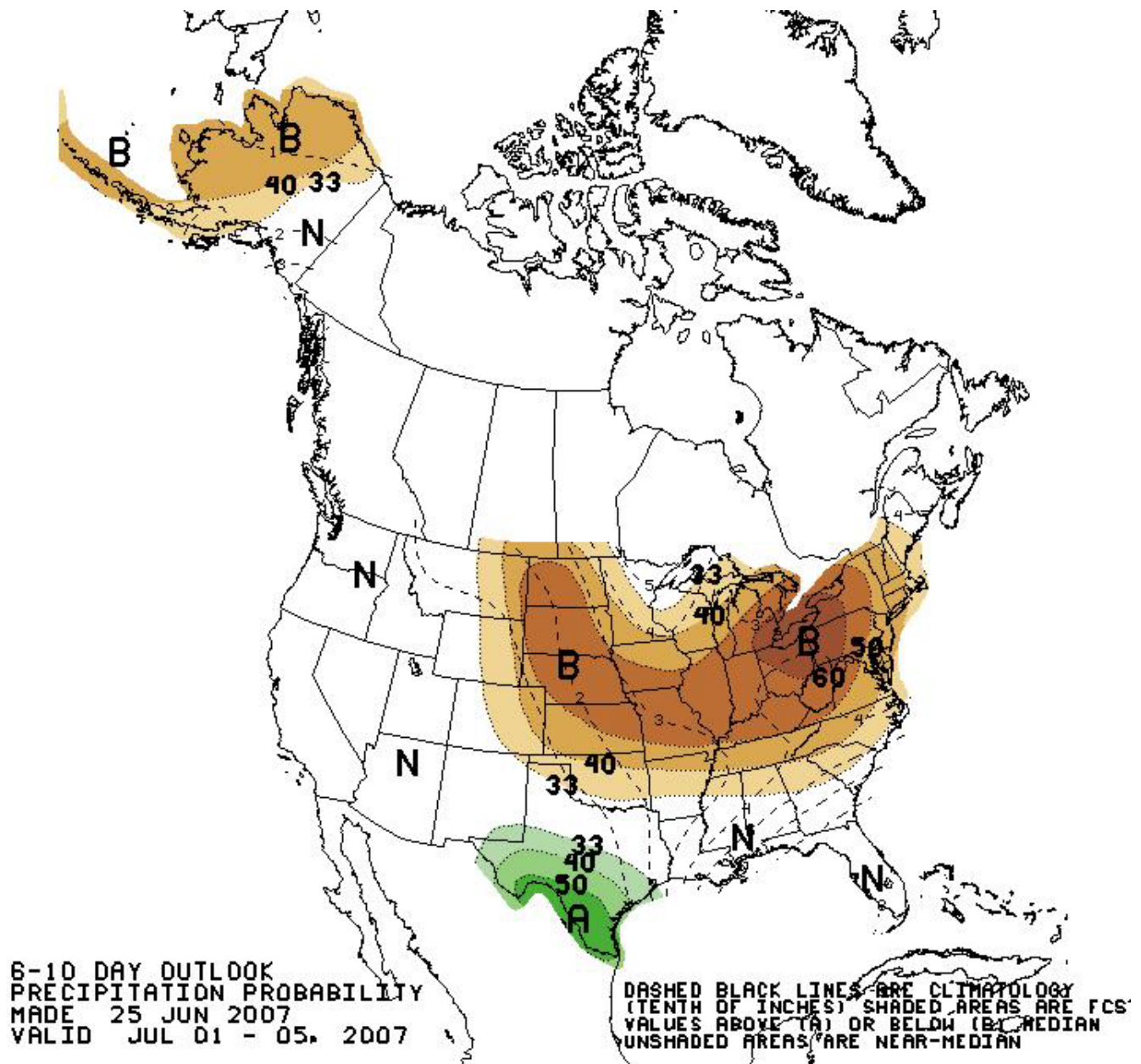
06/26/07 - Precip Deviation from Normal Since Jan 1 (inches)
Ending 7 pm Yesterday

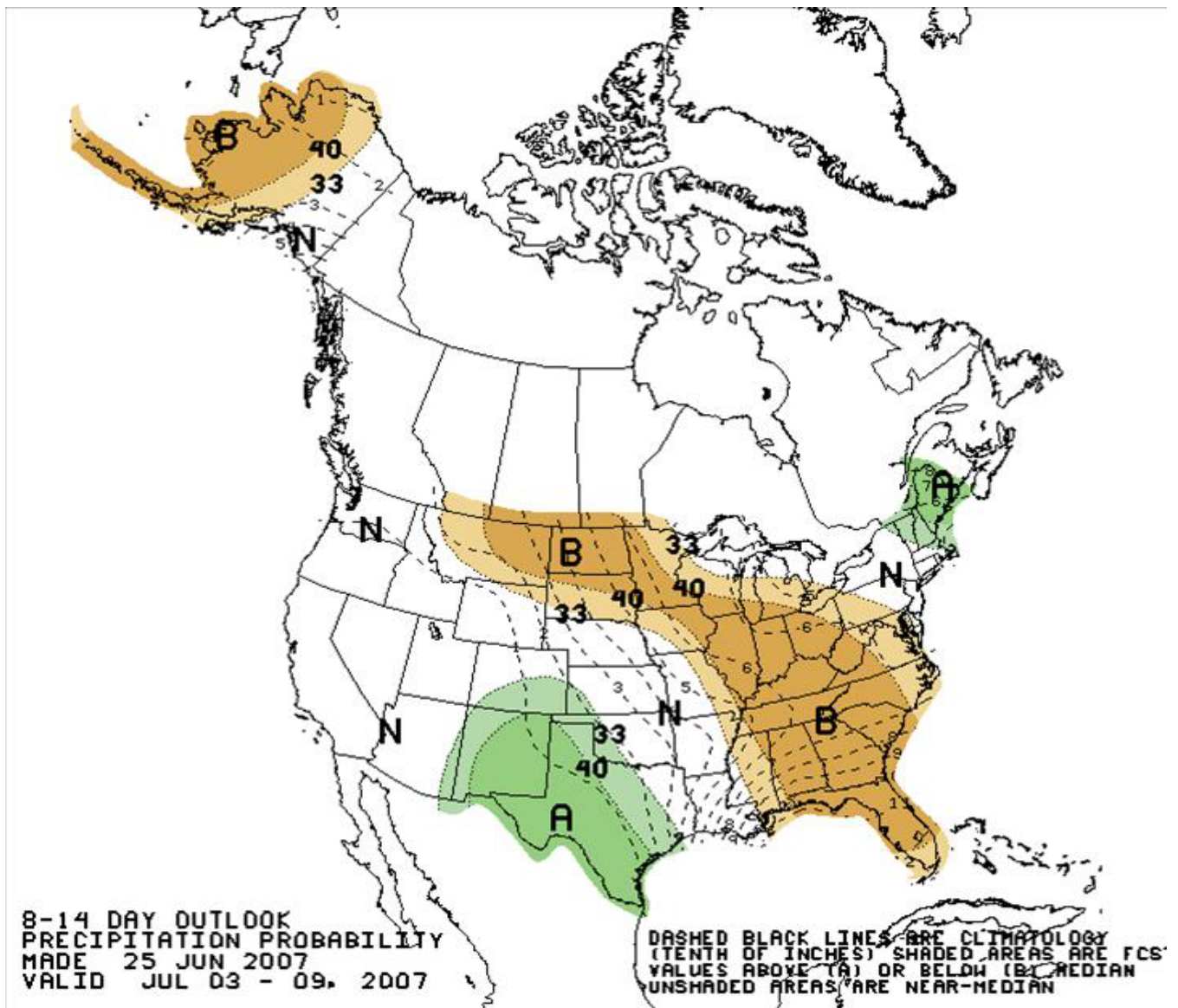
-12 -10 -8 -6 -4 -2



UK
University of Kentucky
College of Agriculture

For the week of June 25, 2007, the precipitation deficit for the past 30 days ranges from 2 to 3 inches below normal across much of Kentucky. For the year, the largest deficits occur in the southern portions of the Western and Eastern climatic divisions. Up to 10-inch deficits in precipitation have developed in parts of the Purchase area of the west and the headwaters of the Kentucky, Licking, Cumberland and Big Sandy river basins in the east. Central and northern Kentucky deficits range from 2 to 4 inches in the extreme north and 4 to 8 inches in the Bluegrass and parts of south-central Kentucky.





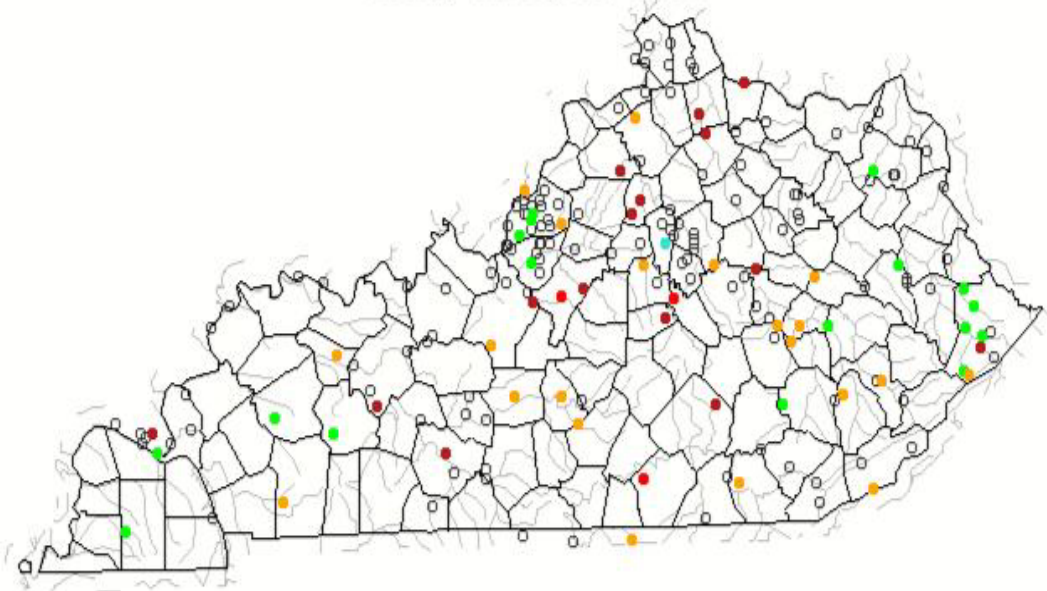
Short-term outlooks from the Climate Prediction Center indicate below-normal chances for precipitation in the next two weeks. However, scattered showers and thunderstorms may continue this week. Even with the unfavorable outlook for widespread precipitation chances, some areas may receive substantial and beneficial rains. This pattern does not favor significant changes to drought indices like the Palmer Index, but it can bring welcome relief to some areas.

Hydrology

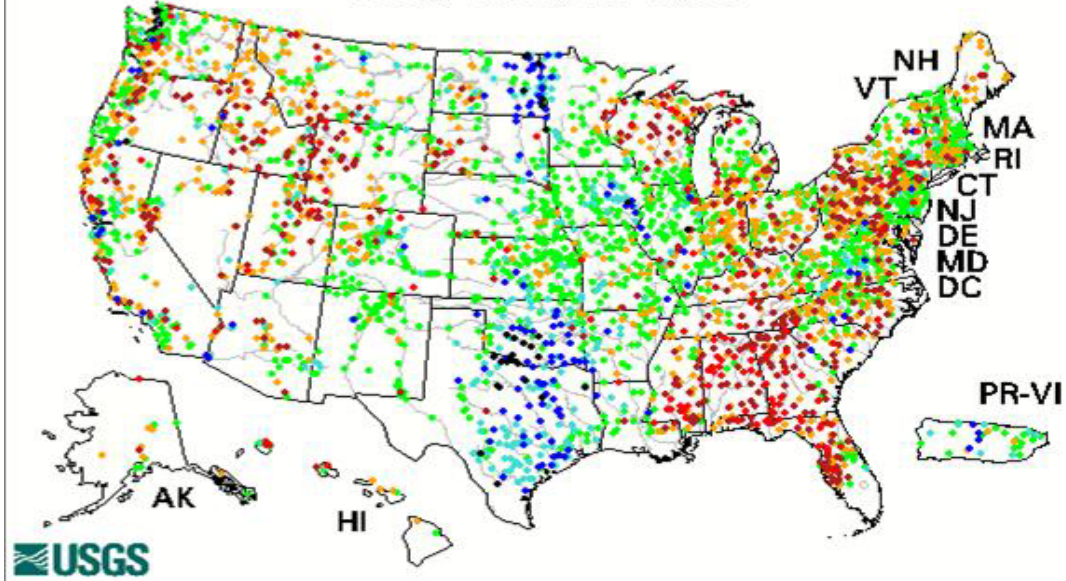
STREAMFLOWS

Current for the week of June 25, 2007

Tuesday, June 26, 2007 13:30ET



Tuesday, June 26, 2007 13:30ET



The [U.S. Geological Survey](#) maintains a [real-time stream gauging network](#) that monitors flows in all major river basins in Kentucky. Measurements of streamflow

are a very good indicator of the longer-term hydrologic impacts of drought. During the developing stages of drought, streamflows provide valuable information on the severity and regional extent of emerging problems. Streamflow data is evaluated relative to the long-term record to determine drought intensity and identify potential problems associated with water shortages. Once a drought has matured, streamflow measurements are critical at many locations where water withdrawals have the potential to cause adverse environmental impacts to streams.

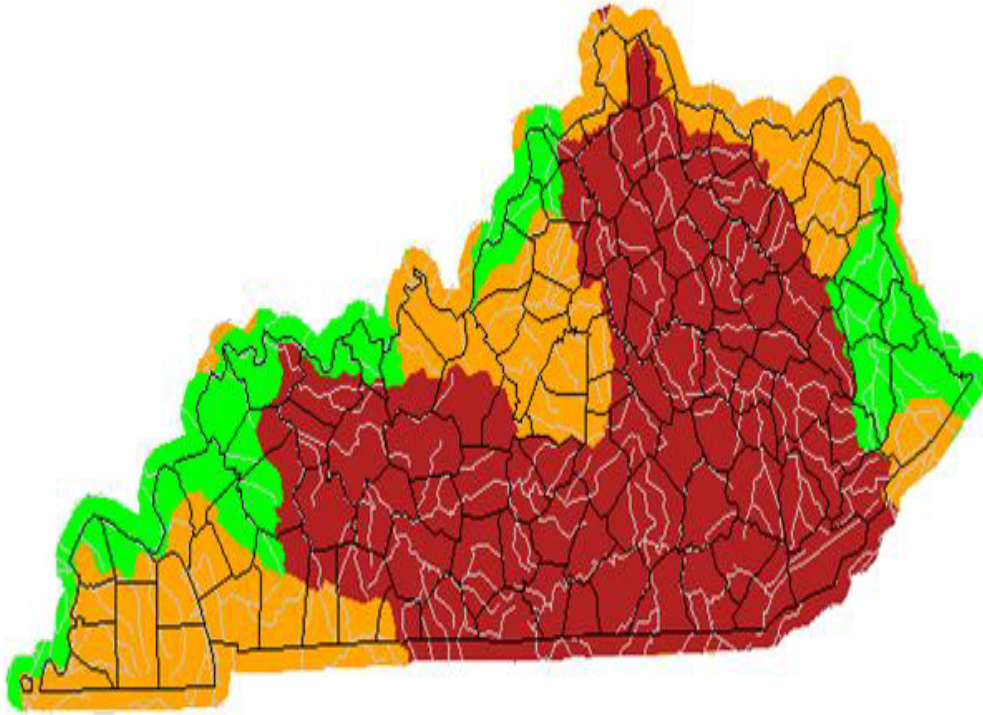
Streamflows across Kentucky have held and even improved slightly in many areas after a week of scattered and sometimes heavy storms. Streams in the Green, Barren, lower Kentucky, lower Licking and most of the Salt River basins continue to flow at low or below normal rates. Areas including the Tradewater River basin and those further west are holding up well and are within a normal range of flow for this time of year in most streams. Similarly, most streams in the Eastern climatic division are within a normal to low-normal range of flow in spite of precipitation deficits of up to 10 inches below normal. At this time, there are no indications of any immediate problems with water supplies for those systems relying on rivers and streams.

Weekly and Monthly Streamflow

For a slightly longer-term perspective of streamflow conditions across Kentucky, the United States Geological Survey computes average flows for the previous seven, 14 and 28 days. The resulting average streamflow values are categorized relative to the long-term record and assigned levels of severity based on the frequency that similar magnitudes of low flow have occurred in the past. By averaging over a period of several days to several weeks, the values on the map are more indicative of longer-term conditions than daily average or real-time streamflow measurements.

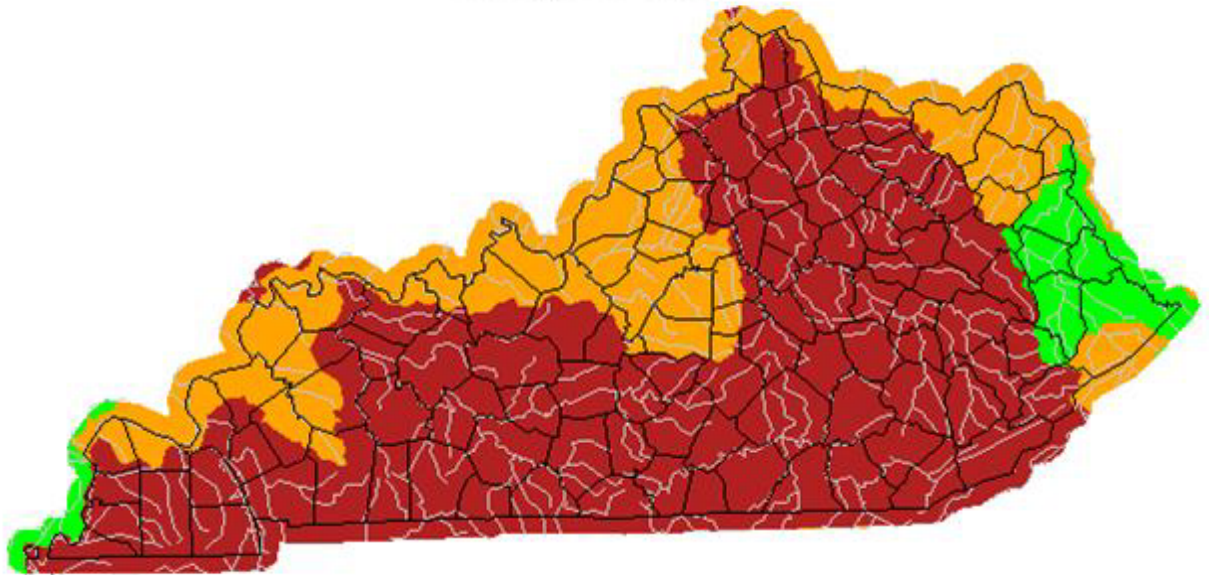
Seven-Day Average Streamflow

Monday, June 25, 2007



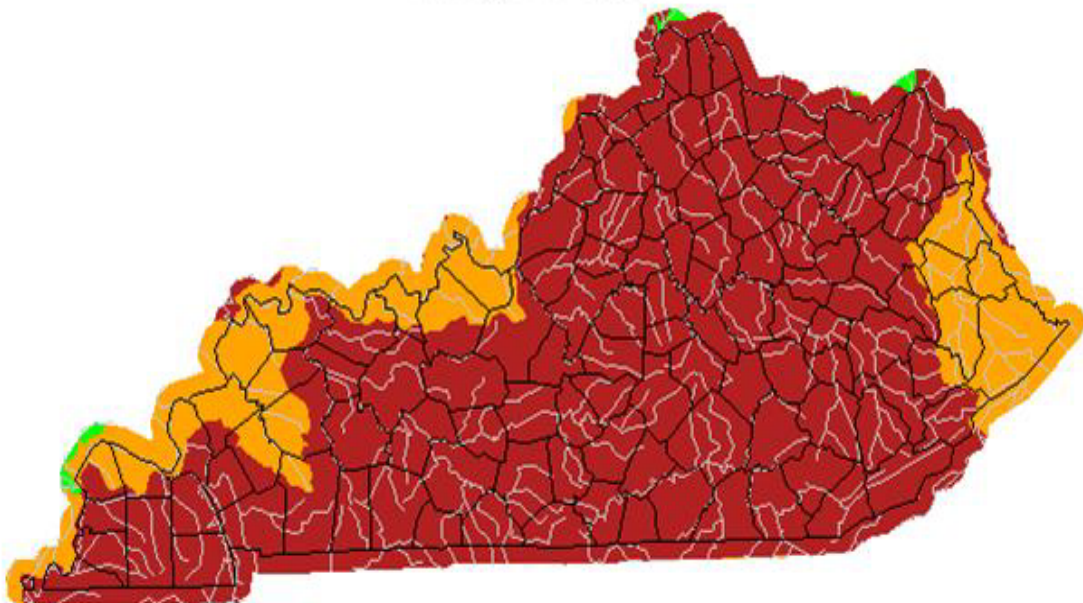
14-Day Average Streamflow

Monday, June 25, 2007



28-Day Average Streamflow

Monday, June 25, 2007



The seven, 14 and 28-day average streamflow indicates that most areas of Kentucky are still experiencing substantial departures from normal flows for this time of year. Using the 28-day low flow as an indicator, all river basins except for the Lower Cumberland, Tradewater and Big Sandy exhibit flows consistent with a severe hydrologic drought.

The effects of spotty and sometimes intense summer storms on streamflows are generally short-lived and may do little for the overall hydrologic drought. Even in normal years, a majority of precipitation in the summer months either runs off into streams, evaporates, or is used by plants and returned to the atmosphere leaving only a small amount to replenish the groundwater "bank" that sustains streamflows during dry spells. The runoff component of summer storms becomes a key contributor to the overall flow in a stream. Thus, while spotty and scattered rains may not end a drought, they are still critical to maintaining adequate flows until more general and widespread relief comes our way.

Lakes and Reservoirs U.S. Army Corps of Engineers Projects

Another useful measure of the impact that drought is having on a region is the status of area lakes and reservoirs. The Division of Water monitors data from 12 projects operated by the U.S. Army Corps of Engineers (USACE) from three USACE districts: [Louisville](#), [Huntington](#) and [Nashville](#). These projects strive to maintain reservoirs at pool levels consistent with the operating guidelines as part of the larger mission of flood control and navigation in the Ohio and Mississippi rivers. Beginning in April, the releases from the reservoirs are managed to allow filling to the "normal summer pool elevation." Significant precipitation deficits in the basin above the reservoir can adversely affect the attainment of normal summer pool elevation. This, in turn, may result in low flows in the river below the project when releases from the reservoir are reduced to the minimum needed for water quality and aquatic habitat.

By examining the data for "current pool elevation" and "current outflow," valuable information about the status of large headwater areas above the USACE reservoirs can be obtained.

**United States Army Corps of Engineer Reservoir Information
Updated June 25, 2007**

Basin	Project	Current Outflow (cfs)	Normal Summer Pool Elevation (ft)	Current Pool Elevation (ft)
Little Sandy	Grayson	25.2	645	643.8
Big Sandy	Dewey	34.6	650	650.6
	Fishtrap	82.5	757	756.9
	Yatesville	25.9	630	629.9
	Paintsville	11	709	708.9
Licking	Cave Run	50	730	729.9
Kentucky	Carr Creek	5	1027	1027.2
	Buckhorn	40	782	782.1
Salt	Taylorsville	32	547	545.8
Green	Green River	49	675	674.8
	Nolin	49	515	515.3
	Barren River	51	552	544.9
	Rough River	49	495	493.2

For the week of June 25, 2007, reservoir levels remain below the normal summer pool elevation at Taylorsville Lake in Spencer County, Barren River Lake in Barren County and Rough River Lake in Breckinridge County and Grayson Lake in Carter County. Lake levels and outflows are good indicators of moderate to severe drought conditions in these areas. It is noteworthy that both Barren River and Rough River lakes have been at or near the minimum release since mid-March, further evidence that the current drought conditions have been under development for some time.

Small Lakes and Water Supply Reservoirs

Water suppliers who rely on small reservoirs are acutely aware of any deviation from normal when it comes to the amount of water in their reservoir. As with the larger USACE projects, these small reservoirs are susceptible to drought impacts that can inhibit the "refilling" or "recharge" over winter and through the spring. In addition, the daily withdrawal of water for water supply can accelerate the drop in water levels so that the ability to withstand long periods of little or no precipitation is compromised.

The Division of Water will monitor selected small water supply reservoirs when conditions indicate that water supplies may be threatened by persistent drought. For the week of June 25, 2007, no reports of abnormally low reservoir levels have been reported.